WHAT IS CLAIMED IS:

1. A method of mounting an optical device comprising the steps of:

preparing a substrate in which at least a first electrode and a second electrode are disposed and an optical device in which a third electrode and a fourth electrode are disposed corresponding to the first electrode and the second electrode respectively, in which

surfaces for mounting the third electrode and the fourth electrode of the optical device have a first height (ah1) and a second height (ah2) from one surface of the optical device on the side opposite to the surface for mounting the third electrode and the fourth electrode, respectively, where ah1>ah2,

each of the first electrode and the second electrode has at least a solder-underlying region and solder on the solder-underlying region, and

letting the solder-underlying region area of the first electrode is aS1, the solder-underlying region area of the second electrode is aS2, the third electrode area is aS3, the fourth electrode area is aS4, the volume of a solder disposed on the solder-underlying region of the first electrode is v1, and the volume of a solder disposed on the solder-underlying region of the second electrode is v2, v1 $\neq$ v2, and

each of the values of ah1, v1, aS1, ah2, v2 and aS2 is

set so that the height of the first electrode and the second electrode from the surface of the solder-underlying region to the opposing surface of the optical device is a height in proportion to ah1 + v1/aS1 or ah2 + v2/aS2 after the solder has been melted; and

positioning the substrate and the optical device so that the third electrode of the optical device is disposed on the first electrode of the substrate and the fourth electrode of the optical device is disposed on the second electrode of the substrate, melting the solder and soldering the semiconductor element to the substrate.

2. A mounting method of an optical device according to claim 1, wherein the volume (v1, v2) of the solder formed corresponding to each of the first electrode and the second electrode disposed on the substrate is prepared such that the value (v1/aS1, v2/aS2) obtained by dividing the volume (v1, v2) by each of the areas (aS1, aS2) of the solder-underlying region of the first electrode and the second electrode on the substrate has a relation of v2/aS2>v1/aS1.

3. A mounting method of an optical device according to claim 1, wherein the surface of the second electrode of the substrate that is in contact with and covered with the solder has a region of material having a nature of increasing the height of solder to higher than the initial height by the

melting of the solder, and the area of the solder prepared for the second electrode is larger than the area of the solder-underlying region below the solder, in the preparation step.

4. A mounting method of an optical device according to claim 2, wherein the surface of the second electrode of the substrate that is in contact with and covered with the solder has a region of material having a nature of increasing the height of solder to higher than the initial height by the melting of the solder, and the area of the solder prepared for the second electrode is larger than the area of the solder-underlying region below the solder, in the preparation step.

5. A mounting method of an optical device according to claim 1, wherein the surface of the first electrode of the substrate that is in contact with and covered with the solder has a region of material having a nature of decreasing the height of solder to lower than the initial height by the melting of the solder, and the area of the solder prepared for the first electrode is formed smaller than the area of the solder-underlying region below the solder, in the preparation step.

6. A mounting method of an optical device according to claim 2, wherein the surface of the first electrode of the substrate that is in contact with and covered by the solder has a region of a material having a nature of decreasing the height of solder to lower than the initial height by the melting of the

solder, and the area of the solder prepared for the first electrode is formed smaller than the area of the solder-underlying region below the solder, in the preparation step.

7. A mounting method of an optical device according to claim 1, wherein the solder-underlying region has a solder underlying layer and a conductor layer disposed therebelow and has the solder layer one the solder underlying layer.

8. A mounting method of an optical device according to claim 2, wherein the solder-underlying region has a solder underlying layer and a conductor layer disposed therebelow and has the solder layer on the solder underlying layer.

9. A mounting method of an optical device according to claim 3, wherein the surface of the substrate in a region in contact with and covered by the solder is formed with at least one member selected from the group consisting of silicon oxide film, silicon nitride film, polyimide type organic polymer resin, chromium (Cr), platinum (Pt), molybdenum (Mo), and tungsten (W).

10. A mounting method of an optical device according to claim 4, wherein the surface of the substrate in a region in contact with and covered with the solder is formed with at least one member selected from the group consisting of silicon oxide film, silicon nitride film, polyimide type organic polymer resin, chromium (Cr), platinum (Pt), molybdenum (Mo), and tungsten (W).

11. A mounting method of an optical device according to

claim 1, wherein the solder is an alloy of gold (Au) and tin (Sn).

12. A mounting method of an optical device according to claim 1, wherein the substrate is a silicon substrate.

13. A mounting method of an optical device according to claim 1, wherein the area of the solder-underlying region of the first electrode is substantially identical with that of the third electrode, and the area of the solder-underlying region of the second layer is substantially identical with that of the fourth electrode.

14. An optical head device comprising:

a light source for irradiating a disk substrate with light to conduct at least one of writing and reading of information; and

a driving circuit for driving the light source to output light,

wherein the light source is mounted by a mounting method including the steps:

preparing a substrate in which at least a first electrode and a second electrode are disposed and an optical device in which a third electrode and a fourth electrode are disposed corresponding to the first electrode and the second electrode respectively, in which

surfaces for mounting the third electrode and the fourth

electrode of the optical device have a first height (ah1) and a second height (ah2) from one surface of the optical device on the side opposite to the surface for mounting the third electrode and the fourth electrode, respectively, where $ah1>ah2$,

each of the first electrode and the second electrode has at least a solder-underlying region and solder on the solder-underlying region, and

letting the solder-underlying region area of the first electrode is aS1, the solder-underlying region area of the second electrode is aS2, the third electrode area is aS3, the fourth electrode area is aS4, the volume of a solder disposed on the solder-underlying region of the first electrode is v1, and the volume of a solder disposed on the solder-underlying region of the second electrode is v2, $v1 \neq v2$, and

each of the values of ah1, v1, aS1, ah2, v2 and aS2 is set so that the height of the first electrode and the second electrode from the surface of the solder-underlying region to the opposing surface of the optical device is a height in proportion with $ah1 + v1/aS1$ or $ah2 + v2/aS2$ after melting of the solder, and

positioning the substrate and the optical device so that the third electrode of the optical device is disposed on the first electrode of the substrate and the fourth electrode of the optical device is disposed on the second electrode of the

substrate, melting the solder and soldering the semiconductor element to the substrate.

15. An optical head device according to claim 14, wherein the light source has a constitution in which plural semiconductor laser devices are mounted on a predetermined substrate, and the plural semiconductor laser devices include, at least one semiconductor laser device having plural electrodes connected electrically to the plural electrodes on the substrate which are formed at positions corresponding to the surface of the substrate and at different levels, and in which the semiconductor laser device is formed by the mounting method of the optical device.

16. An optical head device according to claim 14, wherein the light source includes plural semiconductor laser devices, an optical detector for automatic focusing detection and optical detector for tracking detection mounted monolithically on a predetermined substrate, and

the plural semiconductor laser devices include at least one semiconductor laser device in which at a least first electrode and a second electrode connected electrically to the plural electrodes on the substrate are formed at the height different from each other from one surface of the substrate of the semiconductor laser device, and

the semiconductor laser device mounted by a mounting

method including the steps;

preparing a substrate in which at least a first electrode and a second electrode are disposed and an optical device in which a third electrode and a fourth electrode are disposed corresponding to the first electrode and the second electrode respectively, in which

surfaces for mounting the third electrode and the fourth electrode of the optical device have a first height (ah1) and a second height (ah2) from one surface of the optical device on the side opposite to the surface for mounting the third electrode and the fourth electrode, respectively, where ah1>ah2,

each of the first electrode and the second electrode has at least a solder-underlying region and solder on the solder-underlying region, and

letting the solder-underlying region area of the first electrode is aS1, the solder-underlying region area of the second electrode is aS2, the third electrode area is aS3, the fourth electrode area is aS4, the volume of a solder disposed on the solder-underlying region of the first electrode is v1, and the volume of a solder disposed on the solder-underlying region of the second electrode is v2, v1 ≠ v2, and

each of the values of ah1, v1, aS1, ah2, v2 and aS2 is set so that the height of the first electrode and the second electrode from the surface of the solder-underlying region to

the opposing surface of the optical device is a height in proportion with ah1 + v1/aS1 or ah2 + v2/aS2 after melting of the solder, and

positioning the substrate and the optical device so that the third electrode of the optical device is disposed on the first electrode of the substrate and the fourth electrode of the optical device is disposed on the second electrode of the substrate, melting the solder and soldering the semiconductor element to the substrate, and in which

optical paths from the optical source to the disk substrate passing through the light source, a beam splitter and an objective lens is made into a single constitution.

17. An optical head device according to claim 16, wherein the substrate is a semiconductor substrate.

18. An optical head device according to claim 16, wherein the light source includes plural semiconductor laser devices, optical detectors for automatic focusing detection and optical detectors for tracking detection and amplifiers for amplifying signals from both of the detectors mounted monolithically on a predetermined substrate.

19. An optical head device according to claim 16, wherein a material layer having a high thermal conductivity is disposed between the substrate and the semiconductor laser device.

20. An optical head device according to claim 16, wherein a material layer capable of relaxing stresses is disposed between the substrate and the semiconductor laser device.